



Chronology

Late 1960s:

President Nixon establishes the Space Task Group to make recommendations regarding America's next decade in space. The group's recommendation focuses on the need for a reusable shuttlecraft.

Source: NASA Astronautics and Aeronautics, 1971, p. 62.

Early 1970s:

NASA initiates Space Shuttle development activities. Marshall will be responsible for the Shuttle's major propulsion elements: the Space Shuttle main engines, solid rocket boosters, and external tank.

Source: NASA Press Kit, "First Space Shuttle Mission STS-1," April 1981.

April 30, 1970:

NASA lets three \$6 million contracts for Phase B studies on the Space Shuttle main engine—Aerojet-General Corporation, Rocketdyne Division of Rockwell Division of North American Rockwell, and Pratt & Whitney Aircraft. Marshall will manage the contracts.

Source: NASA Astronautics and Aeronautics, 1970, p. 157.

December 22, 1970:

NASA selects McDonnell Douglas Astronautics Corporation and North American Rockwell for parallel 11-month definition and preliminary design studies for a reusable Space Shuttle. A Space Shuttle Task Team at Marshall will manage the McDonnell Douglas work.

Source: MSFC Release, December 22, 1970.

March 1, 1971:

The Mississippi Test Facility (known today as the Stennis Space Center) is selected as the site for sea-level testing of the Space Shuttle main engine.

Source: NASA Astronautics and Aeronautics, 1971, p. 60.

January 5, 1972:

President Nixon formally endorses plans for the Space Shuttle. Following the announcement, then NASA Administrator James Fletcher says, the Space Shuttle “will change the nature of what man could be in space. By the end of decade the Nation will have the means of getting men and equipment to and from space routinely.”

Source: NASA Astronautics and Aeronautics, 1972, pp. 4-5.

March 15, 1972:

Dr. Fletcher announces that the Space Shuttle will be powered by recoverable, reusable, solid rocket motors in a parallel burn configuration rather than by pressure-fed, liquid-fueled rockets. The “choice was made in favor of the solid parallel burn because of lower development costs and lower technical risks,” Fletcher said.

Source: NASA Astronautics and Aeronautics, 1972, p.102.

March 19, 1972:

Marshall's Space Shuttle Task Team is abolished with the formation of a permanent Shuttle Program Office at Marshall. Roy E. Godfrey will manage the office.

Source: Marshall Star, May 17, 1972.

May 16, 1972:

The Marshall Center reaches an agreement with the U.S. Army Corps of Engineers, Huntsville Division, to provide facility design and construction in support of the Space Shuttle.

Source: NASA Astronautics and Aeronautics, 1972, p. 184.

August 23, 1972:

A definitive contract for the Space Shuttle main engine is signed with Rocketdyne.

Source: Marshall Star, August 23, 1972.

September 6, 1972:

Marshall announces plans for a series of 20 water-entry simulation tests with a 120-inch-diameter solid rocket casing assembly. The tests were designed to provide data for assessment of Space Shuttle booster water recovery methods and to aid in preliminary solid rocket motor design.

Source: NASA Astronautics and Aeronautics, 1972, p. 309.

During 1972:

Studies by NASA and the aerospace industry concentrate on the technical and economic aspects of the different kinds of boosters.

Source: NASA Astronautics and Aeronautics, 1972, pp. 4-5.

August 16, 1973:

NASA signs a contract with Martin Marietta Corporation for the design, development, and test of the external tank.

Source: NASA Astronautics and Aeronautics, 1973, p. 246.

November 20, 1973:

NASA signs a contract with Thiokol Corporation for negotiation of a contract for design, development, and test of the solid rocket motors.

Source: NASA Astronautics and Aeronautics, 1973, p. 327.

November 21, 1973:

The Marshall Center was conducting drop tests using a solid rocket booster scale model and a three-parachute recovery system to determine the feasibility of keeping parachutes attached to the booster rather than releasing them on impact with the water. The 11½-foot diameter scale model, attached to the parachutes, was dropped from a 200-foot height into the Tennessee River.

Source: Marshall Star, November 21, 1973.

April 24, 1974:

A Space Shuttle main engine component is hot-fired for the first time at Santa Susana, California in a successful run of a preburner assembly.

Source: Marshall Star, April 21, 1974.

September 4, 1974:

The Marshall Center's first static firings related to the Space Shuttle program were underway. A small-scale (6.4 percent) model of the vehicle was used to gather acoustical data vital to design and development activities.

Source: Marshall Star, September 4, 1974.

October 9, 1974:

The Marshall Center was completing a simulation facility, designed to enable engineers to test and verify the Space Shuttle main Engine avionics systems using flight type hardware. No engines would be fired in the Hardware Simulation Laboratory. The main engine “firings” would be mathematical.

Source: Marshall Star, October 9, 1974.

November 13, 1974:

The Marshall Center announces that a contract had been awarded by the Huntsville Division, U.S. Army Corps of Engineers, to Alegernon-Blair Industrial Contractors for modifications of the Saturn S-IC Test Stand for structural testing of the external tank.

Source: Marshall Star, November 13, 1974.

March 26, 1975:

Rocketdyne completes the first Space Shuttle main engine and the integrated subsystem test bed a month ahead of schedule. The engine was not built for flight but for static testing.

Source: Marshall Star, March 26, 1975.

April 16, 1975:

The first Space Shuttle flight-like test hardware, a ground test hydraulic actuator for the Space Shuttle main engine, arrived at the Center. Each of the orbiter’s three main engines will use two of the actuators to gimbal the engine for steering control.

Source: Marshall Star, April 16, 1975.

June 7, 1975:

The integrated subsystem test bed engine is successfully fired for the first time. The test lasted 0.8 seconds.

Source: NASA Astronautics and Aeronautics, 1975, p. 105.

June 11, 1975:

The prime contractor for the external tank, Martin Marietta Aerospace, awards a sub-contract to Avco for the manufacture of the intertank to provide support between the liquid-oxygen tank and the larger liquid-hydrogen tank.

Source: NASA Astronautics and Aeronautics, 1975, p. 108.

June 24, 1975:

The integrated subsystem test-bed engine main chamber firing is conducted.

Source: NASA Astronautics and Aeronautics, 1975, p. 120.

November 20, 1975:

The external tank critical design review is completed at the Michoud Assembly Facility, clearing the way for production.

Source: Marshall Star, November 26, 1975.

During 1975:

The solid rocket motor design, development, test, and engineering project is definitized. The resulting development program will include seven full-scale motor static tests and delivery of 12 flight motors for the first six development flights.

Source: Space Shuttle Status Report to Congress, 1978, p. 187.

September 10, 1975:

Marshall engineers were completing tests aimed at refining the means of towing recovered solid rocket boosters to shore for refurbishment and reuse.

Source: NASA Astronautics and Aeronautics, 1975, p. 186.

October 22, 1975:

Fixtures were nearing completion at the Michoud Assembly Facility for manufacturing the external tank, which stood 154-feet tall with a 27-foot diameter and designed to hold more than a million gallons of propellant and weigh more than 1.5 million pounds. Several of the fixtures at the assembly site were more than half the length of a football field and several stories high. Two fixtures at Michoud, each supported by massive steel tripods anchored in concrete on each side, were so huge and so imposing that they were nicknamed “Trojan Horses.”

Source: Marshall Star, October 22, 1975.

During 1975:

A 405-foot-tall Saturn V Dynamic Test Stand at Marshall was being modified under a contract between the Army Corps of Engineers and Universal Construction to provide a mated ground vibration test facility. The structure would be used to test the vehicle in launch and boost configuration to determine the bending modes and dynamic response during launch and ascent conditions. The orbiter Enterprise was used later in the tests at the facility.

Source: Marshall Star, November 5, 1975.

July 28, 1976:

Assembly of the first external tank was underway at the Michoud Assembly Facility.

Source: Marshall Star, July 28, 1976.

During September 1976:

The Space Shuttle main engine critical design review was conducted clearing the design for further testing.

Source: Space Shuttle Status Report to Congress, 1978, pp. 157–158.

December 17, 1976:

United Space Boosters, Inc., of Sunnyvale, California, is selected as the solid rocket booster assembly contractor, immediately following completion of the solid rocket booster critical design review that was eight months ahead of schedule.

Source: Marshall Star, January 5, 1977.

March 14, 1977:

An external tank intertank test article is delivered to the Marshall Center for structural tests. It passed all tests by November 1977.

Source: Marshall Star, March 16, 1977.

March 16, 1977:

The Space Shuttle main engine had been successfully tested at rated thrust conditions for 60 seconds during the previous weekend with a total test duration of slightly over 80 seconds.

Source: Marshall Star, March 16, 1977.

July 18, 1977:

The first firing of a solid rocket motor takes place in Utah. The motor runs for about two minutes in what observers describe as a “near perfect” test. The motor is referred to as Development Motor–1.

Source: Marshall Star, July 20, 1977.

September 9, 1977:

The first external tank, the Space Shuttle’s largest component, rolls off its New Orleans assembly line.

Source: Marshall Star, September 14, 1977.

During September 1977:

Pressure tests are conducted to demonstrate the capability of the solid rocket motor cases to be used up to 20 times.

Source: Marshall Star, September 14, 1977.

November 30, 1977:

The external tank liquid oxygen structural test article had recently been delivered to the Marshall Center.

Source: Marshall Star, November 30, 1977.

During November 1977:

The intertank structural test program is completed for the first external tank.

Source: MSFC Release 77–234

During December 1977:

The tanking test on the external tank is conducted at National Space Technology Laboratories.

Source: Marshall Center News Release 77–234.

During 1977:

Solid rocket booster testing begins at Marshall and other facilities in the U.S. Because of renewed testing at Marshall, modifications are made on a Saturn test stand to accommodate structural testing of the solid rocket boosters.

Source: Marshall Star, December 21, 1977.

January 18 1978:

The solid rocket motor Development Motor–2 test is successfully conducted in the Utah desert.

Source: Marshall Star, January 25, 1978.

March 6, 1978:

The liquid hydrogen tank and interstage section of an external tank had been unloaded from the NASA barge Orion at the Marshall Center docks on the Tennessee River. Plans call for this section of the external tank to be used in a structural test program at Marshall. A complete external tank, which arrived at the same time on the barge Poseidon, will be used for mated vertical ground vibration testing.

Source: Marshall Star, March 8, 1978.

March 18–19, 1978:

About 85,000 people gather at the Marshall Center to get a close-up look at the Space Shuttle orbiter Enterprise and a complete external tank. The orbiter arrived piggyback in Huntsville on a 747 aircraft. Plans call for the orbiter and external tank to be mated in Marshall's Dynamic Test Stand. Later the solid rocket boosters will be added. The elements will be used for mated vertical ground vibration tests at Marshall.

Source: Marshall Star, March 22, 1978.

May 10, 1978:

In a static firing, a Space Shuttle main engine successfully completes a test at 100 percent of its rated power level for the full duration expected during actual flight.

Source: Marshall Star, May 17, 1978.

May 19, 1978:

Three Space Shuttle main engines roar to life in the first major test of the Shuttle's main propulsion system. Orange flame and a huge cloud of white smoke pour from beneath the stand during the 15-second run.

Source: Marshall Star, Marshall May 24, 1978.

October 19, 1978:

The solid rocket motor Development Motor–3 test is successfully conducted in the Utah desert.

Source: Marshall Star, October 25, 1978.

February 17, 1979:

The test of the solid rocket motor Development Motor–4, the final development test, is conducted. This test series verifies the basic design requirements and paves the way for solid rocket motor qualification testing designated as Qualification Motor–1 and Qualification Motor–2.

Source: Marshall Star, Marshall February 21, 1979.

March 19, 1979:

The NASA barge Poseidon, with Space Shuttle components aboard, pulls out from the Marshall Center dock on the Tennessee River to begin an 11-day trip to Kennedy Space Center. On board are the external tank used at the Marshall Center for mated vertical ground vibration testing and two solid rocket booster nose cap forward skirt assemblies. The items will to be used at the Kennedy Center in "Pathfinder" operations—a checkout of movement and assembly "fit checks" at the Vehicle Assembly Building—and for training in "stacking" the Space Shuttle on the mobile launcher platform.

Source: Marshall Star, March 21, 1979.

June 13, 1979:

The first of a series of test firings of solid rocket motors is initiated to qualify the motors for manned flight. The test is referred to as Qualification Motor–1.

Source: Marshall Star, June 20, 1979.

June 27, 1979:

A major milestone in the Space Shuttle main engine test program is reached when a flight configuration engine successfully completes the first series of tests preliminary to flight certification. The test series, which began March 14, 1979, totaled 16 firings and accumulated 5,245 seconds of firing time.

Source: Marshall Star, July 4, 1979.

July 6, 1979:

The first flight external tank (ET–1) is delivered to Kennedy Space Center from the Michoud Assembly Facility.

Source: Marshall Star, August 8, 1979.

September 27, 1979:

The second in a series of test firings of a solid rocket motor is conducted to qualify the motors for manned flight. This test is referred to as Qualification Motor–2.

Source: Marshall Star, October 3, 1979.

February 8, 1980:

A major milestone in the Space Shuttle main engine test program is reached when a flight configuration engine successfully completed the second series of tests preliminary to flight certification. This second series of tests began September 22, 1979.

Source: Marshall Star, February 20, 1980.

February 13, 1980:

The solid rocket motor passes its last major test with a 2-minute firing at Thiokol's Utah facility. This test is referred to as Qualification Motor-3.

Source: Marshall Star, February 20, 1980.

March 13, 1980:

The first full-power level test (109 percent of rated power level) of the Space Shuttle's main engine is completed.

Source: Marshall Star, March 19, 1980.

July 26-27, 1980:

The third Space Shuttle main engine is reinstalled on the orbiter Columbia over the weekend at Kennedy Space Center. The other two engines had been reinstalled the previous weekend. The three engines had been removed from Columbia and shipped to National Space Technology Laboratories for a series of successful test firings that recertified them for flight. The additional firings were conducted because several modifications and component replacements had been made since the original certification firings.

Source: Marshall Star, August 6, 1980.

November 7, 1980:

The mating of the solid rocket boosters and the external tank for STS-1 is completed in the Vehicle Assembly Building at Kennedy Space Center.

Source: Marshall Star, November 12, 1980.

December 2, 1980:

The fourth and final cycle of preliminary certification tests of the Shuttle's main engine first flight configuration is completed.

Source: Marshall Star, December 4, 1980.

December 3, 1980:

Engineers in the Marshall Center's Huntsville Operations Support Center gear up to work in teams around the clock to support the final major test of the Space Shuttle as an integrated flight system.

Source: Marshall Star, December 17, 1980.

December 29, 1980:

STS-1 arrives at Complex 39's Pad A at the Kennedy Space Center.

Source: Marshall Star, December 3 and January 7, 1981.

January 17, 1981:

NASA's test version of the Space Shuttle's main propulsion system successfully completes its last scheduled test firing. The firing that lasted 10 minutes, 29 seconds is the 12th and longest, test of the system to date.

Source: Marshall Star, January 21, 1981.

February 20, 1981:

The Space Shuttle three main engines roar to life for 20 seconds on the launch pad at Kennedy Space Center during the flight readiness firing of the orbiter Columbia's engines.

Source: Marshall Star, February 25, 1981.

February 27, 1981:

Testing of the method selected to repair areas of debonded insulation on the external tank is completed at National Space Technology Laboratories.

Source: Marshall Star, March 4, 1981.

March 19, 1981:

The Dry Countdown Demonstration Test is conducted for STS-1.

Source: Marshall Star, March 25, 1981.

March 30, 1981:

The external tank is declared ready for flight following repairs to its thermal protection system and subsequent testing at the Kennedy Space Center.

Source: Marshall Star, April 1, 1981.

April 12, 1981:

Powered by Marshall Center propulsion elements, Columbia begins its voyage with a flawless 6:00 a.m. (CST) launch. Commander John Young and Pilot Robert Crippen guide the vehicle into orbit. The historic flight concludes two days later when Columbia lands at Edwards Air Force Base in California.

Source: Marshall Star, April 15, 1981.